

U.S. Serial No. 10/060,247

Reply to Official Action dated June 19, 2003

IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Claims 1-24. (Canceled)

Claim 25. (Currently Amended) A magnetoresistive device comprising:

a magnetization pinned layer of which magnetization direction is substantially pinned to one direction;

a magnetization free layer of which magnetization direction is changed in accordance with an external magnetic field;

a nonmagnetic intermediate layer formed between the magnetization pinned layer and the magnetization free layer; and

electrodes allowing a sense current to flow in a direction substantially perpendicular to the plane of the stack including the magnetization pinned layer, the nonmagnetic intermediate layer and the magnetization free layer,

wherein both of the magnetization pinned layer and the magnetization free layer have has a laminate structure comprising alternately laminated layers of: at least two ferromagnetic layers and at least one insert layer formed between the two ferromagnetic layers, in which the ferromagnetic layers are ferromagnetically coupled.

the ferromagnetic layers being formed of an alloy represented by the general formula
given below:



where $0 < c \leq 75 \text{ at\%}$, $0 < d \leq 75 \text{ at\%}$, $0 < e \leq 63 \text{ at\%}$, and $c + d + e = 100$; and

U.S. Serial No. 10/060,247

Reply to Official Action dated June 19, 2003

ii the insert layer being at least one layer formed of at least one element selected from the group consisting of Cr, V, Ta, Nb, Sc, Ti, Mn, Cu, Zn, Ga, Ge, Zr, Hf, Y, Tc, Re, Ru, Rh, Ir, Pd, Pt, Ag, Au, B, Al, In, C, Si, Sn, Ca, Sr, Ba, O, N and F, and having a thickness falling within a range of between 0.03 nm and 1 nm.

Claim 26. (Previously Presented) A magnetic head comprising the magnetoresistive device according to claim 25.

Claim 27. (Previously Presented) A magnetic recording-reproducing apparatus, comprising a magnetic recording medium, and the magnetoresistive device according to claim 25.

Claim 28. (New) The magnetoresistive device according to claim 25, the stack further comprises an antiferromagnetic layer arranged on the magnetization pinned layer.

Claim 29. (New) The magnetoresistive device according to claim 28, wherein one of the electrodes is a lower electrode and other electrode is an upper electrode arranged under and over the stack including the antiferromagnetic layer, the magnetization pinned layer, the nonmagnetic intermediate layer and the magnetization free layer, respectively.

Claim 30. (New) The magnetoresistive device according to claim 25, wherein the insert layer is formed of Zn, Ti, Mn, Cu, Hf, Ga, Ge or Zr.

U.S. Serial No. 10/060,247

Reply to Official Action dated June 19, 2003

Claim 31. (New) The magnetoresistive device according to claim 25, wherein a thickness of each of the magnetization pinned layer and the magnetization free layer ranges from 0.5 nm to 3.5 nm.